

REMARKS

Claims 18-29 are in the application, all stand rejected.

Claims 18 through 29 were rejected as obvious over Kasai et al., EP 684,637A3 in view of Ho et al., US 5,643,823. Applicant respectfully traverses.

An element of Applicant's invention, appearing in both independent claims 18 and 23, is the presence of a "continuous monocrystalline silicon nitride layer." Applicant's have discovered that this can be achieved by first removing native oxide with a hydrogen bake. Applicant's have found that failing to perform a hydrogen bake resulted in deposition of amorphous, not crystalline nitride. Kasai does not teach any such hydrogen bake and, in fact, clearly states the oxide impurities are in the reaction chamber while forming the nitride layer. Hence, Kasai's nitride film must necessarily be contaminated with oxides and their reaction products. Needless to say, contaminated nitride cannot be crystalline. Indeed, Kasai teaches away from Applicant's invention because he explicitly states that it is the contamination of the nitride layer that makes his scheme work. This is found at column 7, lines 37 to 52 of Kasai, which reads:

Since the concentration of oxygen of the oxygen monoatomic layer formed on the silicon layer is 1.36×10^{15} atoms/cm², the concentration of oxygen of the natural oxide film formed on the silicon layer is at least more than the above value. *Generally, in the case where the thermal nitride film is formed on the silicon oxide film, the formed thermal nitride film takes in oxygen of the silicon oxide film.* Due to this, the concentration of oxygen of the nitride film thermally formed without removing the natural oxide film is at least 1.36×10^{15} atoms/cm² or more. Therefore, in the case where the concentration of oxygen of the thermal nitride film formed on the silicon layer is less than 1.36×10^{15} atoms/cm², *the natural oxide film is removed to form the thermal nitride film.*

Hence it is apparent that Kasai is using the thermal nitride film to remove the native oxide. Ho doesn't teach reaction conditions that would contaminate his CVD nitride layer and

so it is apparent that the two references cannot be combined to arrive at Applicant's invention as claimed.

CONCLUSIONS

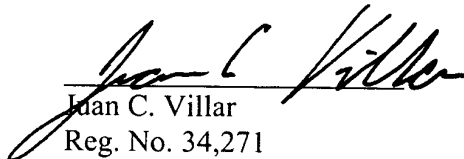
For all of the foregoing reasons, Applicant believes the claims to be in condition for allowance and respectfully request same.

If the Examiner is relying on any personal knowledge in rejecting any claims, Applicants respectfully request that any such knowledge be made known to Applicants in an affidavit in accordance with 37 C.F.R §1.107.

This response to a final office action is being mailed within two months thereof.

Respectfully submitted,

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Box PATENT APPLICATION

Sir:

Transmitted herewith is an amendment in the identified application noted below.

☒ No additional fee is required.

In re application of: Jammy et al.

Serial No.: 09/524,638

Filed: June 15, 2000

For: METHOD FOR FORMING CRYSTALLINE SILICON NITRIDE

The filing fee has been calculated as shown below:

	(Col. 1)		(Col. 2)		(Col. 3)	OTHER THAN A SMALL ENTITY FEE	
CLAIMS	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NO. PREVIOUSLY PAID FOR		PRESENT EXTRA	RATE	ADDIT. FEE
TOTAL	<u>12</u>	MINUS	<u>12</u>	=	<u>0</u>	x 18 =	\$ <u>0</u>
INDEP	<u>3</u>	MINUS	<u>3</u>	=	<u>0</u>	x 84 =	\$ <u>0</u>
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM						+ 280 =	\$0
TOTAL							\$ <u>0</u>

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- ☒ Any additional filing fees required under 37 CFR 1.16 for the presentation of excess claims.
- ☒ Any patent application processing fees under 37 CFR 1.17.

Respectfully submitted,

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Date: January 7, 2002

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